

Magnitude of eclipse wikipedia

The term eclipse is most often used to describe either a solar eclipse, when the Moon's shadow crosses the Earth's surface, or a lunar eclipse, when the Moon moves into the Earth's shadow. However, it can also refer to such events beyond the Earth-Moon system: for example, a planet moving into the shadow cast by one of its moons, a moon passing into the shadow cast by its host planet, or a moon passing into the shadow of another moon. A binary star system can also produce eclipses if the plane of the orbit of its constituent stars intersects the observer's position.

Lunar eclipses can be viewed from the entire nightside half of the Earth. But solar eclipses, particularly total eclipses occurring at any one particular point on the Earth's surface, are very rare events that can be many decades apart.

Typically the cross-section of the objects involved in an astronomical eclipse is roughly disk-shaped.^[7] The region of an object's shadow during an eclipse is divided into three parts:^[8]

The first contact occurs when the eclipsing object's disc first starts to impinge on the light source; second contact is when the disc moves completely within the light source; third contact when it starts to move out of the light; and fourth or last contact when it finally leaves the light source's disc entirely.

On Earth, the shadow cast during an eclipse moves very approximately at 1°/km per sec. This depends on the location of the shadow on the Earth and the angle in which it is moving.^[10]

As observed from the Earth, a solar eclipse occurs when the Moon passes in front of the Sun. The type of solar eclipse event depends on the distance of the Moon from the Earth during the event. A total solar eclipse occurs when the Earth intersects the umbra portion of the Moon's shadow. When the umbra does not reach the surface of the Earth, the Sun is only partially occulted, resulting in an annular eclipse. Partial solar eclipses occur when the viewer is inside the penumbra.^[14]

The eclipse magnitude is the fraction of the Sun's diameter that is covered by the Moon. For a total eclipse, this value is always greater than or equal to one. In both annular and total eclipses, the eclipse magnitude is the ratio of the angular sizes of the Moon to the Sun.^[15]

Solar eclipses are relatively brief events that can only be viewed in totality along a relatively narrow track. Under the most favorable circumstances, a total solar eclipse can last for 7½ minutes, 31½ seconds, and can be viewed along a track that is up to 250½ km wide. However, the region where a partial eclipse can be observed is much larger. The Moon's umbra will advance eastward at a rate of 1,700½ km/h, until it no longer intersects the Earth's surface.

During a solar eclipse, the Moon can sometimes perfectly cover the Sun because its apparent size is nearly the same as the Sun's when viewed from the Earth. A total solar eclipse is in fact an occultation while an annular solar eclipse is a transit.

When observed at points in space other than from the Earth's surface, the Sun can be eclipsed by bodies other than the Moon. Two examples include when the crew of Apollo 12 observed the Earth to eclipse the Sun in 1969 and when the Cassini probe observed Saturn to eclipse the Sun in 2006.

Lunar eclipses occur when the Moon passes through the Earth's shadow. This happens only during a full moon, when the Moon is on the far side of the Earth from the Sun. Unlike a solar eclipse, an eclipse of the Moon can be observed from nearly an entire hemisphere. For this reason it is much more common to observe a lunar eclipse from a given location. A lunar eclipse lasts longer, taking several hours to complete, with totality itself usually averaging anywhere from about 30 minutes to over an hour.¶16¶93;

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